CS4055 Digital Image Processing

BS(AI)-6J&6K

Assignment 2 - Total marks: 30 - April 12- April 20, 2023

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Title: Data Augmentation, Morphological Images, and Visualizations Assignment

Use the previous assignment dataset of medical images. Your task is to perform the following tasks on the dataset using Python and relevant libraries.

Task 1: Data Augmentation (10 Marks)

- Load the dataset of medical images.
- Implement a function to perform data augmentation on the images in the dataset. The function should include the following techniques:
  - Image rotation
  - Image flipping
  - Image scaling
  - Image cropping
  - Image brightness adjustment
- Apply the data augmentation function to the dataset, and save the augmented images to a new folder.

Task 2: Morphological Image Processing (10 Marks)

- Load an image from the dataset.
- Implement a function to perform morphological image processing on the image. The function should include the following techniques:
  - Dilation
  - Erosion
  - Opening
  - Closing
- Apply the morphological image processing function to the image and save the processed image to a new folder.

Task 3: Visualizations (10 Marks)

- Load an image from the dataset.
- Implement a function to generate visualizations of the image. The function should include the following visualizations:

- Image histogram
- Image gradient magnitude
- Image thresholding
- Apply the visualization function to the image and save the visualizations to a new folder.

Requirements

- Use the following libraries: numpy, matplotlib, opencv, and scikit-image.
- The dataset should be in the form of a folder containing multiple medical images in PNG format.
- Use comments and docstrings to explain your code.

Submission

Submit a zip file containing your Python code and the augmented, processed, and visualized images.